UCRL-JC-124028 Abs

Abstract submitted to
24th ECLIM University of Madrid
3-7 June 1996

Electron Density Measurements Using Soft X-ray Lasers*

L. B. Da Silva, T. W. Barbee, Jr., R. Cauble, P. Celliers, C. D. Decker,
R. A. London, J. C. Moreno, J. E. Trebes, A. S. Wan and F. Weber

Lawrence Livermore National Laboratory
P.O. Box 808, Livermore, California, 94550

The reliability and characteristics of collisionally pumped soft x-ray lasers make them ideal for a wide variety of plasma diagnostics. These systems now operate over a wavelength range extending from 35 to 400 Å and have output energies as high as 10 mJ in 150 ps pulses. The beam divergence of these lasers is less than 15 mrad and they have a typical linewidth of $\Delta\lambda/\lambda \sim 10^{-4}$ making them the brightest xuv sources available. Taking advantage of recently developed multilayer beamsplitters we have constructed and used a Mach-Zehnder interferometer operating at 155 Å to probe 1-3 mm size laser produced plasmas with peak electron densities of $4\times10^{21}\,\mathrm{cm}^{-3}$. Using this interferometer we have also been able to measure the spatial and temporal coherence properties of the neon-like yttrium x-ray laser. Results from these experiments as well as our use of x-ray laser moiré deflectometry to measure the electron density profile in ICF hohlraums will be discussed.

* *Work performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under contract number W-7405-ENG-48*